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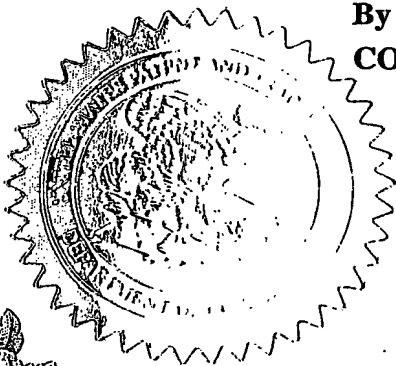
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# **PROVISIONAL APPLICATION FOR PATENT COVER SHEET** This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

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HEAD PROTECTOR

TITLE OF THE INVENTION (280 characters max)

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ENCLOSED APPLICATION PARTS (check all that apply)



Specification Number of Pages

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Application Data Sheet, See 37 CFR 1.76



Other (specify)



METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT (check one)



Applicant claims small entity status. See 37 CFR 1.27.



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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.



No.



Yes, the name of the U.S. Government agency and the Government contract number are:

Respectfully submitted

SIGNATURE

Date 03/28/03

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28,168

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(if appropriate)  
Docket Number:

74698-88 /ala

## **USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT**

This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Washington, D.C.

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# **PROVISIONAL APPLICATION COVER SHEET** Additional Page

PTO/SB/16 (8-00)  
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Docket Number		74698-88/ala	Type a plus sign (+) inside this box <input type="checkbox"/>	+
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Number 1 of 1

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Title of the InventionHEAD PROTECTORField of the Invention

The present invention relates to head protectors  
5 and protective armour, and in particular but not limited to  
head protectors and armour for protecting personnel against  
blasts from explosives and other ordinance.

Summary of the Invention

According to one aspect of the present invention,  
10 there is provided a helmet comprising a shell, a shield  
member and coupling means for coupling the shield member to  
the shell and permitting movement of said shield member  
relative to said shell, and shock absorption means coupled  
to said coupling means and arranged to permit movement of  
15 said shield member relative to said shell independently of  
said coupling means.

According to another aspect of the present  
invention, there is provided a helmet comprising a shell and  
a shield member coupled to said shell for movement between a  
20 first position and a second position relative to said shell,  
and a locking system for locking said shield member in at  
least one of said first and second positions and comprising  
a rotary cam mounted on said shell, an aperture formed in  
said shield member and an opening in the side of said  
25 aperture for receiving said cam into said aperture, said  
aperture permitting rotation of said cam when located in  
said aperture to a position which prevents movement of said  
cam from said aperture through said opening.

According to another aspect of the present  
30 invention, there is provided a helmet comprising a shell and

a shield member coupled to said shell for movement between a first position and a second position relative to said shell, and a locking system for locking said shield member in at least one of said first and second positions, and comprising  
5 a lock for preventing movement of said shield member relative to said shell and a manually accessible, depressible member adapted to release said lock on depression thereof, thereby allowing said shield member to move from the respective first or second position.

10 According to another aspect of the present invention, there is provided protective armour comprising a layer of a plastic, transparent material, a plurality of layers of high performance material, said layers being bonded together to form a laminate, and securing means for  
15 securing said laminate to said layer of plastic transparent material.

According to another aspect of the present invention, there is provided a visor for a helmet comprising a layer of plastic transparent material, a plurality of  
20 layers of high performance material, said layers being bonded together to form a laminate and securing means for securing said laminate to a portion of the surface of said plastic transparent material.

According to another aspect of the present  
25 invention, there is provided a process for forming protective armour comprising the steps of providing a layer of plastic transparent material, forming a laminate comprising a plurality of layers of high performance material and securing said laminate to said layer of plastic  
30 transparent material.


According to another aspect of the present invention, there is provided a helmet comprising a shell, a

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strap guide mounted on each side of the helmet in a position for supporting a strap for passing under the chin of a wearer, when in use, a strap which passes through and between each strap guide such that the portion of said strap  
5 between said strap guides form a chin strap, a support member coupled to the rear of said shell to allow relative movement between said support member and said shell and for engaging a portion of the head or neck of a wearer, when in use, said strap extending from each strap guide to said  
10 support member, and a pull member extending from a position between said support member and said strap guides and which is arranged to cause the length of said strap extending from said support member through said strap guides to shorten when said pull member is pulled.

15           According to another aspect of the present invention, there is provided a retention system for a helmet comprising first and second strap guides for mounting on each side of the helmet in a position for supporting a strap for passing under the chin of a wearer, when in use, a strap  
20 which passes through and between each strap guide, the portion of said strap between said strap guides forming a chin strap, a support member for movably coupling to the rear of said helmet for engaging a portion of the head or neck of a wearer when in use, said strap extending from each  
25 strap guide to said support member, and pull members extending from said support member and which are arranged to cause the length of said strap extending from said support member through said strap guides to shorten when said pull members are pulled.

30           According to another aspect of the present invention, there is provided a helmet comprising a shell, an electrically powered system for assisting a wearer, and a power controller for controlling the power delivered to said



system, wherein said power controller is releasably mounted to said shell.

According to another aspect of the present invention, there is provided a helmet comprising a shell, a visor having a moisture reducing treatment on the surface thereof facing the interior of the shell, and electrically powered means for providing ventilation air to the interior of said helmet, said electrically powered means being mounted to said helmet.

According to another aspect of the present invention, there is provided a control unit for controlling an electrically powered system for a helmet, the control unit having securing means for releasably securing the control unit to a helmet.

#### 15 Description of Embodiments

Examples of embodiments of the present invention will now be described with reference to the drawings.

##### Impact Absorbing Mounting

Figures 1 and 2 show a helmet according to an embodiment of the present invention. In particular, Figure 1 shows a cross-sectional view through a portion of the helmet and Figure 2 shows a side view of the helmet.

Referring to Figures 1 and 2, a helmet 1 comprises a shell 3 and a shield member 5, which in this embodiment comprises a visor disposed towards the front of the helmet (although in other embodiments, the shield member may comprise any other member for providing additional protection at another position about a wearer's head). The helmet further includes a coupler 7 for coupling the visor 5 to the shell 3 and which permits movement of the visor

5

relative to the shell. The helmet further includes a shock absorption member 9 which is coupled to the coupler 7 and arranged to permit movement of the visor 5 relative to the shell 3 independently of the coupler 7.

5           In this particular embodiment, the coupler 7 comprises a pin or bolt for pivotally coupling the visor to the shell and the shock absorption member 9 comprises a bush of resilient material at least partially surrounding the coupler 7.

10           In this embodiment, a mounting block 11 is positioned between the exterior of the shell 3 and the visor 5 and has a receptacle 13 in which the resilient bushing 9 is accommodated. The receptacle may extend from one side of the mounting to the other, as shown in Figure 1, or may  
15 extend partially through the mounting block. In this embodiment, the pin 7 is advantageously used also as a securing means for securing the mounting block 11 to the shell, and passes through an aperture 15 formed in the shell. The pin has an enlarged portion 17 positioned on the  
20 interior side of the shell which prevents the pin from being drawn through the aperture 15. The other end 19 of the pin includes a threaded portion 21 for receiving a nut 23 to secure the mounting and visor assembly to the shell.

          In this embodiment, and as shown in particular in  
25 Figure 2, the shock absorption member 9 is arranged to permit movement of the visor 5 in a direction towards the interior of the helmet or towards the rear of the helmet as indicated by the arrows 25, 27 in Figure 2. In this  
embodiment, the shock absorption member 9 also allows  
30 movement of the visor in all directions transverse to the pivot axis 29, shown in Figure 1 as it completely surrounds the pin. However, in other embodiment, the shock absorbing



mounting may limit relative movement between the visor and shell to one direction or a limited range of directions.

Advantageously, the shock absorbing mounting system provides some mechanical decoupling of the visor or  
5 other shield member from the helmet shell, thereby reducing transmission of shock or transient forces from the visor or shield member to the shell. This may be advantageous in reducing rearward acceleration of the shell and therefore of the head of the helmet user when exposed to shock waves from  
10 a blast or explosion to the front of the helmet, and to reduce the risk of head trauma or concussion.

In other embodiments, the mounting block 11 may be omitted and the visor connected to the shell via a coupling and impact absorbing arrangement which is disposed either  
15 between the coupling and the shell or the coupling and the visor.

In another embodiment, a shock absorption arrangement, for example, a resilient member may be placed between the pin or bolt 7 and the visor 5, for example so  
20 that the shock absorption system is carried on the visor, rather than or in addition to a mounting block and/or the shell.

Generally, the shock absorption means serves to allow movement of the visor relative to the shell and limits  
25 the rate of relative movement or displacement, and may comprise any suitable element or arrangement of elements.

In another embodiment, the visor or other shield member may be slidably mounted to the helmet shell and a shock absorption element or system may be arranged between  
30 the slidable mounting and the shell and/or between the visor and the slidable mounting.

Locking Mechanism

Figure 3 shows a helmet according to another embodiment of the present invention. The helmet 31 comprises a shell 33 and a visor 35 which is pivotally coupled to the shell by means of a hinge or pivot 37 to allow the visor to be raised and lowered. A locking mechanism 39 is provided to enable the visor to be locked in at least one of the lowered position and the raised position. An embodiment of a locking system is shown in more detail in Figures 4 and 5. The locking system 39 comprises a rotary cam 41 which is rotatably mounted to the shell 31, and a manually accessible knob 43, which allows the cam 41 to be rotated by hand. In this embodiment, a cam mounting block 45 is provided for mounting the cam 41 to the helmet shell and which may include any suitable arrangement for rotatably supporting and retaining the cam. The visor 35 has first and second apertures 49, 51 formed therein, each having an opening 53, 55 formed in the side of the aperture to allow the cam 41 to be received within the aperture. The apertures 49, 51 are shaped and sized to allow the cam 41 to rotate within the aperture to a position which prevents movement of the cam from the aperture through the opening, thereby locking the visor in a fixed position with respect to the helmet shell.

In this particular embodiment, the cam comprises an elongate member whose width is sufficiently small to allow the cam to pass through the opening into the aperture. In other embodiments, the cam may have any other suitable form and may, for example, comprise a discrete protrusion which is spaced radially (i.e. positioned eccentrically) with respect to the cam axis 57.

Advantageously, the provision of a cam locking system allows the visor to be locked and unlocked quickly (i.e. by requiring only a fraction of a revolution thereof between locking and unlocking) in comparison to other locking mechanisms which require multiple rotations of a locking screw. Advantageously, the cam system also allows the width or profile "w" of the mounting block to be considerably reduced in comparison to locking mechanisms which use a screw-down system, where the mounting block needs to be sufficiently deep to accommodate additional thread to allow the screw lock to fully clear the visor.

Figures 6A to 6D show another embodiment of a locking mechanism for locking a visor to a helmet shell. In particular, Figure 6A shows a top view of the locking system, Figure 6B shows a plan view of the locking system, Figure 6C shows a cross-section through the locking system and Figure 6D shows a perspective view of the locking system. The locking system shown in Figures 6A to 6D may be incorporated in any helmet disclosed herein, as well as others, and may for example replace the locking mechanism described above with reference to Figures 3 to 5. Referring in particular to Figure 6C, the locking system 71 comprises a lock 73 for preventing movement of a visor relative to a helmet shell, and a manually accessible, depressible member 75 which is adapted to release the lock on depression thereof to release the visor from the locked position. In one embodiment, the locking system comprises a mounting block 77 which conveniently accommodates components of the lock assembly and has a mounting face 79 for mounting against a helmet shell (not shown). The mounting block includes a recess 81 for accommodating the lock 73. A bias 83 is provided for urging the lock 73 out of the recess 79 and which may comprise a bias spring located within the

recess 81. The locking system further includes a mounting member 85 which is fixedly mounted to the mounting block 77 and has an aperture 86 formed therein for receiving the depressible member (e.g. button) 75. The mounting member 85 serves to retain the movable member or lock 73 at least partially within the recess 79 when the button is released and guides reciprocal movement of the button 75 and the lock 73. In use, a visor 35 is positioned between the mounting member 85 and the mounting block 77 and has at least one aperture formed therein, for example, aperture 227, 229 of embodiments of the visor shown in Figures 10 and 11, and which correspond to the positions in which the visor is to be locked. The apertures include an opening 231, 233 (Figures 10 and 11) in the side thereof which is sufficiently large to accommodate the diameter of the button shaft 87 but which is smaller than the diameter or width of the locking member 73.

In operation, depression of the button 75 moves the locking member 73 into the recess 81, allowing the button shaft 87 to pass through the opening of the visor aperture (Figure 10 and 11), thereby releasing the visor from the locked position so that the visor can be raised or lowered, as required. Once the visor assumes a position in which the visor can be locked with respect to the shell, release of the button allows the locking member 73 to move into the visor aperture under the force of the biasing spring, thereby locking the visor in place. Advantageously, the visor may be arranged to engage the shoulder 89 of the locking member 73 once the locking member, in its retracted position, is no longer aligned with a visor aperture so that the button 75 remains depressed until the visor assumes a second locking position or re-assumes the original locking position in which a visor aperture becomes aligned with the

locking member. This arrangement allows the visor to be moved into a locking position without the need to depress the button a second time or to continually depress the button when moving the visor from one locking position to another position.

Advantageously, the locking arrangements according to embodiments of the present invention allow the visor to be unlocked, moved and relocked with one hand, and reduce the width or profile of any mounting block that may be used.

In the embodiment of Figures 6A to 6D, the mounting block 77 also includes a mounting for pivotally mounting the visor to a helmet shell. Advantageously, the pivotal mounting may include shock absorption means between the mounting 77 and the visor 35 to reduce the transmission of shock from the visor to the mounting and subsequently to the helmet shell, or vice versa, as for example, described above with reference to Figure 1 and 2.

In one embodiment, the mounting assembly may optionally include a clip 91 for holding a light source e.g. torch or flashlight (not shown) or other device such as a camera or microphone.

#### Protective Armour

Figure 7 shows a protective armour construction according to an embodiment of the present invention, and which may be used, for example, in the construction of a visor for a helmet. Referring to Figure 7, the protective armour 101 comprises a first substrate 103 comprising a transparent plastic material, and a second substrate 105 comprising a plurality of layers 107 of high performance material which are laminated together. Each layer of high performance material may comprise a material having a high

tensile strength transverse to its thickness,  $t$ , examples of which may include but are not limited to a high performance fabric, either woven or non-woven, for example Spectra®, Dyneema®, Kevlar®, as well as others. Each layer 107 may  
5 comprise a composite of high performance material and thermo-plastic resin. The second substrate or laminate 105 may be formed by applying at least one of pressure and heat to the plurality of layers when in contact with one another to cause the thermo-plastic resin in each layer to bond with  
10 an adjacent layer.

The second substrate 105 is secured to the first substrate 103 by any suitable means, for example, by adhesive or by one or more mechanical elements or agents, such as bolts, rivets, screws or other mechanical means.

15 In one embodiment, the second substrate may be secured to the first substrate by means of urethane. The inventors have found that urethane can provide an exceptionally strong and uniform bond between the laminate and transparent plastic substrate 103. The bonding process  
20 may be performed by placing a sheet or layer of urethane between the first and second substrates and applying heat to the urethane sheet, for example, sufficient to cause melting of the urethane sheet. Advantageously, the melting point of urethane is relatively low and will generally be below that  
25 of the first and second substrates. Pressure may also be applied between the first and second substrates to maintain the urethane sheet in intimate contact therewith during the bonding process.

The first substrate may comprise polycarbonate or  
30 acrylic or another similar material. In other embodiments, any other suitable adhesive may be used to bond the first

and second substrates together and which may or may not be provided in sheet form.

The combination of a transparent plastic material and laminate provides a protective construction which can be  
5 thinner than a construction formed of layers of transparent plastic material alone, (e.g. acrylic or polycarbonate) and yet provide a similar level of protection.

Figures 8 to 11 show various views of a visor for a helmet which employs in its construction an embodiment of  
10 the protective armour described above.

Referring to Figures 8 to 11, the visor 201 comprises a substrate 203 formed of a plastic transparent material, for example, polycarbonate, and a second substrate 205 comprising a plurality of layers of high performance  
15 composite material. As shown in Figures 9 to 11, the second substrate 205, which is generally opaque, is secured over a portion of the first substrate 203, and in the present embodiment defines a window 209 for permitting light to pass therethrough.

20 The visor also includes a further substrate 211 positioned over the front surface of the first substrate 203. The additional substrate 211 comprises a transparent material and may, for example, comprise acrylic or polycarbonate. The additional substrate may be secured to  
25 the first and/or second substrates using any suitable means, for example, rivets 213, 215 or other mechanical means, or by adhesive. A spacer 217 may be provided between the first and additional substrates 203, 211 to prevent direct contact between them.

30 In a specific embodiment, the first substrate 203 comprises polycarbonate and the additional substrate 211

comprises acrylic. The additional substrate 211 extends over a limited portion of the first substrate 203, and in particular over an area opposite the viewing window 209, and serves to enhance the level of protection of the transparent area of the visor. In particular, acrylic, which is harder than polycarbonate, presents a hard strike face to explosive fragments, causing the fragments to slow rapidly and break into smaller parts. The use of the combination of a layer of polycarbonate and laminate of high performance material allows the amount of acrylic, which is heavier than polycarbonate, used in the construction of the visor, to be considerably reduced, and in particular eliminates the need to use acrylic over the entire exterior surface or strike face of the visor. In the present embodiment, the use of acrylic is limited substantially to the transparent area of the visor resulting in a lighter construction. At the same time, the combination of a layer of polycarbonate (or other transparent plastic material) and a laminate of high performance material allows the thickness of the visor construction to be reduced, which in turn allows the forward extension of the visor also to be reduced. This assists in moving the center of gravity of the helmet rearwards for better balance.

Although in the embodiment shown in Figures 8 to 11, the second substrate 205 is placed behind the first substrate, in other embodiments, this order may be reversed so that the second substrate is placed in front of the first substrate.

Advantageously, embodiments of the visor whose construction employs the first and second substrate combination described herein significantly reduces the weight of the visor in comparison to known visor constructions, thereby resulting in a lighter helmet,




reduced weight towards the front of the helmet for improved balance and a reduced moment about the center of the helmet which tends to tilt the helmet forward.

The protective armour construction described and  
5 defined herein may be used in the construction of protective armour for protecting any other part of the body.

#### Helmet Retention System

Figures 12 to 16 show examples of embodiments of a helmet retention system. Referring to Figures 12 to 16, a  
10 helmet retention system 301 comprises first and second strap guides 303, 305 for mounting on each side of a helmet in a position for supporting a strap which passes under the chin of a wearer. The retention system includes a strap 307 which passes through and between each strap guide 303, 305,  
15 the portion of the strap between the strap guides forming a chin strap 309. The retention system further includes a support member 311 for coupling to the rear of a helmet and for engaging a portion of the head or neck of a wearer, when in use. In this embodiment, the support member includes  
20 flexible members 313, 315 for movably coupling the support member 311 to a helmet. The strap 307 extends rearwardly towards the support member 311, and the retention system includes two pull members 317 (only one of which is shown in Figures 12 to 14) which extend from the support member 311  
25 and which are arranged to cause the length of the strap 307 extending from the support member, 311 through the strap guides 303, 305 to shorten on pulling the pull members 317. A toggle 319 or other member or feature may be provided on one or both pull members to allow the pull members to be  
30 gripped more easily.

In the present embodiment, the pull members are part of the strap 307 and the retention system comprises



additional strap guides 321 which are connected to the support member 311. Each strap guide 321 comprises a cylindrical guide member 323 and a bar member 325 extending from the cylindrical guide member and forming an aperture along its length. Each strap passes around the cylindrical member and through the aperture, thereby causing the strap to change direction and allowing the length of the strap which extends from the additional guides 321 and through the first and second guides 303, 305 to be shortened by pulling on the portion of the strap, which extends beyond the other side of the additional strap guides, in a direction towards the front of the retention system. In use, this single action both tightens the chin strap around the chin of the helmet wearer and tightens the support member against the back of the head or neck at the same time, considerably reducing the number of steps required to secure the helmet in position in comparison to other retention arrangements which require individual adjustment of the chin and nape supports.

Referring to Figures 12 to 16, the bar member 325 is mounted on the cylindrical member in such a way that the spacing between the bar member and the cylindrical member closes on pulling the strap, thereby squeezing the strap between the bar member and the cylindrical member. On releasing the strap, friction between the strap and guide member prevents the strap slipping back through the guide member so that tension in the portion of the strap between the additional strap guides and the first and second strap guides 303, 305 can be maintained. The cylindrical member may have a high friction surface provided, for example, by surface structure and in one embodiment, may have a knurled surface.

[REDACTED]

30 prevent direct contact between the connector and the face,  
again for increased comfort.

Figure 13 shows another embodiment of a retention system which includes two separate chin pads 329, 331 each

being slidably mounted on the strap 307 so that its position can be adjusted to suit an individual user.

Figure 14 shows another embodiment of a retention system which also includes two adjustable chin pads 329, 331, and a connector 327 positioned therebetween, so that in use, the connector is positioned under the chin. Figures 15 and 16 show part of a helmet retention system in more detail, and in particular, Figure 15 shows a rear view of a support member and associated strap guide assembly and Figure 16 shows a top view of the embodiment shown in Figure 15.

Figures 15 and 16 illustrate an embodiment of each of the additional strap guides in more detail, and which may be used as the additional strap guides in the embodiments of Figures 12 to 14. Each strap guide comprises a roller or knurled buckle having a substantially rectangular ring 324 and a cylindrical member 323 slidably received on two arms of the ring via through holes. One side of the ring is secured to the support member 311 and the other side 325 provides a bar member which, with the cylindrical member provides a clamp for clamping the strap 307 when the strap is pulled and the cylindrical member 323 is thereby urged towards the bar member. To release the clamp, the bar member is simply swung away from the support member 311, as for example, shown in Figure 16, which causes the cylindrical member to slide away from the bar member 325 expanding the gap therebetween and releasing the strap 307.

In this embodiment, a clip 343, 345 is provided on each flexible member 313, 315 to facilitate mounting and removal of the helmet retention system to and from a helmet. In this particular embodiment, each clip has a T-hole for

registration with a corresponding T-screw mounted on the helmet.

Advantageously, the chin strap may be arranged to be worn under the chin or jaw and away from the front of the chin, to allow the helmet to be worn with a respiratory device such as a gas mask.

#### Helmet Control Unit

Figures 17 and 18 each show a perspective view of a helmet according to another embodiment of the present invention. Referring to Figures 17 and 18, the helmet 401 comprises a shell 403 and a control unit 410. The helmet further includes an electrically powered system for assisting a wearer which may be positioned at the control unit, at other parts of the helmet, or both. The control unit 410 may be arranged to control functions of the electrically powered system and which may include, for example, controlling the power delivered to the system. The controller may include a monitoring system for monitoring a condition or function of the electrically powered system and may provide an output indicative thereof.

Advantageously, the control unit is releasably mounted to the helmet shell to allow the control unit to be removed. This allows a faulty control unit to be readily replaced and the helmet returned to a serviceable condition in the field, rather than having to return the entire helmet to a service center for repair, in which case the helmet could be de-commissioned for some considerable time. In one embodiment, the control unit may be slidably mounted to the shell by any suitable means, and may include a retention and slidable guide system 412. The control system may include one or more electrical input/output terminals which connect

with corresponding electrical input/output terminals 414 mounted on the helmet shell.

In one embodiment, the control unit includes one or more electrically powered fans or other impellers 416, 5 418 for providing ventilation air to the interior of the helmet, for example, through ventilation ports 420, 422. The helmet may include a microphone and/or speaker system (not shown) and a visor 405. In a particularly advantageous embodiment, the interior surface of the visor may be treated 10 with a moisture or condensation reducing agent which reduces or completely removes the need for ventilation air to prevent condensation on the interior surface of the visor. This reduces the amount (e.g. CFM) of ventilation air required by the helmet, thereby reducing power consumption 15 and allowing the electrical power source (e.g. motor) to be smaller in comparison to existing systems. Reduction in the requirement for ventilation air also allows a quieter motor to be used so that the motor can be mounted close to the helmet shell without causing significant noise and 20 interference with audio equipment.

The helmet may include an indicator for indicating a condition or function monitored by the control unit, and the indicator may, for example, comprise an audio indicator, a visual indicator or a tactile indicator or any combination 25 of these. One or more indicators may be included on the control unit and/or on other parts of the helmet.

Other perspective views of the helmet of Figures 17 and 18 are shown in Figures 19 to 21, and the helmet may include any one or more further features disclosed herein.

30 Modifications or changes to the embodiments described above will be apparent to those skilled in the art.

CLAIMS:

1. A helmet comprising a shell, a shield member and coupling means for coupling the shield member to the shell and permitting movement of said shield member relative to said shell, and shock absorption means coupled to said coupling means and arranged to permit movement of said shield member relative to said shell independently of said coupling means.
2. A helmet as claimed in claim 1, wherein said coupling means comprises pivot means for pivotally coupling said shield member to said shell.
3. A helmet as claimed in claim 2, wherein said pivot means comprises a pin or bolt coupled to said shield member.
4. A helmet as claimed in any preceding claim, wherein said shock absorption means comprises a member formed of a resilient material.
5. A helmet as claimed in claim 4, wherein said coupling means comprises pivot means for pivotally coupling said shield member to said shell, and wherein said resilient member defines an aperture for receiving said pivot means.
6. A helmet as claimed in claim 5, further comprising a mounting block secured to said shell and having a receptacle for receiving said resilient member.
7. A helmet as claimed in claim 1, wherein said coupling means is arranged to permit slidable movement of said shield member relative to said shell.
8. A helmet as claimed in any preceding claim, wherein said shield member comprises a visor.

9. A helmet comprising a shell and a shield member coupled to said shell for movement between a first position and a second position relative to said shell, and

5 a locking system for locking said shield member in at least one of said first and second positions and comprising a rotary cam mounted on said shell, an aperture formed in said shield member and an opening in the side of said aperture for receiving said cam into said aperture, said aperture permitting rotation of said cam when located  
10 in said aperture to a position which prevents movement of said cam from said aperture through said opening.

10. A helmet comprising a shell and a shield member coupled to said shell for movement between a first position and a second position relative to said shell, and

15 a locking system for locking said shield member in at least one of said first and second positions, and comprising a lock for preventing movement of said shield member relative to said shell and a manually accessible, depressible member adapted to release said lock on  
20 depression thereof, thereby allowing said shield member to move from the respective first or second position.

11. A helmet as claimed in claim 10, further including biasing means for biasing said lock into its locking position.

25 12. A helmet as claimed in claim 10 or 11, wherein said lock comprises a movable member coupled to said depressible member, and one of said shell and said shield member includes receiving means for receiving said moveable member.

30 13. A helmet as claimed in claim 11, further comprising a lock mounting which includes a mounting member



mounted to said shell and having an aperture for receiving said depressible member, and wherein said shield has an aperture formed therein for receiving said movable member.

14. A helmet as claimed in claim 13, wherein said lock mounting further comprises a block adjacent said shell and having a recess for receiving said movable member on depression of said depressible member.

15. A helmet as claimed in claim 14, further including biasing means for urging said moveable member out of said recess.

16. A helmet as claimed in claim 15, wherein said biasing means comprises a spring.

17. A helmet as claimed in any one of claims 14 to 16, comprising a resilient member for coupling said mounting block to said shell and arranged to permit movement of said shield relevant to said shell in a direction towards the interior of said shell.

18. A helmet as claimed in any one of claims 14 to 17, wherein said mounting block includes coupling means for coupling said shield to said shell to allow said shell to move between said first position and said second position.

19. A helmet as claimed in any one of claims 9 to 19, wherein said shield comprises a visor.

20. Protective armour comprising a layer of a plastic, transparent material,

a plurality of layers of high performance material, said layers being bonded together to form a laminate, and

securing means for securing said laminate to said layer of plastic transparent material.

21. Protective armour as claimed in claim 20, wherein said plastic transparent material comprises polycarbonate.

5 22. Protective armour as claimed in claim 20 or 21, wherein said securing means comprises urethane between said layer of plastic transparent material and said laminate.

23. Protective armour as claimed in any one of claims 20 to 22, wherein said high performance material comprises a  
10 high performance fabric.

24. A visor for a helmet comprising a layer of plastic transparent material, a plurality of layers of high performance material, said layers being bonded together to form a laminate and securing means for securing said  
15 laminate to a portion of the surface of said plastic transparent material.

25. A visor as claimed in claim 24, wherein said plastic transparent material comprises polycarbonate.

26. A visor as claimed in claim 24 or 25, wherein each  
20 of said plurality of layers comprises a composite of high performance material and thermo-plastic or thermo-set resin.

27. A visor as claimed in any one of claim 24 to 26, wherein said securing means comprises urethane.

28. A visor as claimed in any one claims 24 to 27,  
25 further comprising a further layer of plastic transparent material overlaying said first layer.

29. A visor as claimed in claim 28, wherein said further layer comprises one of polycarbonate and acrylic.

30. A process for forming protective armour comprising the steps of providing a layer of plastic transparent material,

5 forming a laminate comprising a plurality of layers of high performance material and securing said laminate to said layer of plastic transparent material.

31. A process as claimed in claim 30, wherein the step of forming said laminate comprises providing a plurality of layers of high performance composite material and applying  
10 at least one of pressure and heat to said plurality of layers to secure said layers together.

32. A process as claimed in claim 30 or 31, wherein the step of securing comprises bonding the plastic transparent material to said laminate using urethane.

15 33. A process as claimed in claim 32, wherein the step of securing comprises positioning a sheet or layer of urethane between said plastic transparent material and said laminate and applying at least one of heat to said urethane sheet and pressure between said plastic transparent material  
20 and said laminate.

34. A process as claimed in any one of claims 30 to 33, further comprising applying shape to at least one of the surface of said plastic transparent material and said laminate before securing said layer to said laminate.

25 35. A helmet comprising a shell, a strap guide mounted on each side of the helmet in a position for supporting a strap for passing under the chin of a wearer, when in use,

a strap which passes through and between each strap guide such that the portion of said strap between said  
30 strap guides form a chin strap,

a support member coupled to the rear of said shell to allow relative movement between said support member and said shell and for engaging a portion of the head or neck of a wearer, when in use, said strap extending from each strap  
5 guide to said support member, and

a pull member extending from a position between said support member and said strap guides and which is arranged to cause the length of said strap extending from said support member through said strap guides to shorten  
10 when said pull member is pulled.

36. A helmet as claimed in claim 35, further comprising a further pull member extending from said support member an which is arranged to cause the length of said strap extending from said support member through said strap  
15 guides to shorten when said further pull member is pulled.

37. A helmet as claimed in claim 35 or 36, further comprising resistance means for resisting extension of the length of said strap extending from said support member through said strap guides on releasing the or each pull  
20 member.

38. A helmet as claimed in claim 37, further comprising release means for disabling said resistance means.

39. A helmet as claimed in claim 38, wherein said  
25 release means includes a pull tab arranged to disable to said resistance means when said pull tab is pulled.

40. A helmet as claimed in any one of claims 35 to 39, further comprising a connector for releasably connecting one portion of said strap to a second portion of said strap and  
30 positioned within the length of said strap which extends from said support member through said strap guides.

41. A helmet as claimed in claim 40, wherein said connector is positioned between said strap guides.

42. A retention system for a helmet comprising first and second strap guides for mounting on each side of the helmet in a position for supporting a strap for passing under the chin of a wearer, when in use, a strap which passes through and between each strap guide, the portion of said strap between said strap guides forming a chin strap, a support member for movably coupling to the rear of said helmet for engaging a portion of the head or neck of a wearer when in use, said strap extending from each strap guide to said support member, and pull members extending from said support member and which are arranged to cause the length of said strap extending from said support member through said strap guides to shorten when said pull members are pulled.

43. A retention system as claimed in claim 42, further comprising resistance means for resisting extension of said length on releasing said pull member.

44. A retention system as claimed in claim 42, further comprising release means for disabling said resistance means.

45. A retention system as claimed in any one of claims 42 to 44, wherein the or each pull member comprises an extension of said strap.

46. A helmet as claimed in any one of claims 35 to 41, wherein the or each pull member comprises an extension of said strap.

47. A helmet comprising a shell, an electrically powered system for assisting a wearer, and a power controller for controlling the power delivered to said

system, wherein said power controller is releasably mounted to said shell.

48. A helmet as claimed in claim 47, wherein said power controller comprises monitoring means for monitoring a  
5 condition of said controller.

49. A helmet as claimed in claim 48, further comprising an indicator for indicating said condition.

50. A helmet as claimed in claim 49, wherein said indicator comprises any one or more of an audio indicator, a  
10 visual indicator and a tactile indicator.

51. A helmet as claimed in any one of claims 47 to 50, comprising a housing unit for housing said power controller, said housing unit being releasably mounted to said shell and said housing unit further comprising electrically powered  
15 means for providing ventilation air to the interior of said helmet.

52. A helmet as claimed in claim 51, further comprising a visor, said visor having a moisture reducing treatment on the surface thereof facing the interior of the  
20 shell.

53. A helmet comprising a shell, a visor having a moisture reducing means treatment on the surface thereof facing the interior of the shell, and electrically powered means for providing ventilation air to the interior of said  
25 helmet, said electrically powered means being mounted to said helmet.

54. A helmet as claimed in claim 53, wherein said electrically powered means is mounted adjacent said helmet.

55. A helmet as claimed in claim 53 or 54, comprising a housing unit housing said electrically powered means and which is releasably mounted on said shell.

56. A helmet as claimed in claim 55, wherein said  
5 housing unit is mounted on the exterior of said shell.

57. A helmet as claimed in any one of claims 47 to 56, comprising a visor, said visor comprising a layer of transparent plastic material and a laminate secured to said layer, said laminate comprising a plurality of layers of  
10 high performance material.

58. A helmet as claimed in claim 57, wherein said laminate is secured to said layer of transparent plastic material by urethane.

59. A helmet as claimed in claim 58, wherein each  
15 layer of said laminate comprises a composite of high performance material and thermo-plastic resin.

60. A control unit for controlling an electrically powered system for a helmet, the control unit having securing means for releasably securing the control unit to a  
20 helmet.

61. A control unit as claimed in claim 60, further comprising a monitor for monitoring a condition of said control unit.

62. A control unit as claimed in claim 61, further  
25 comprising an indicator for indicating said condition.

63. A control unit as claimed in claim 62, wherein said indicator comprises any one or more of an audio indicator, a visual indicator and a tactile indicator.

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Fig 1

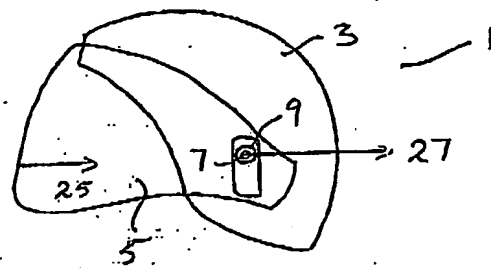
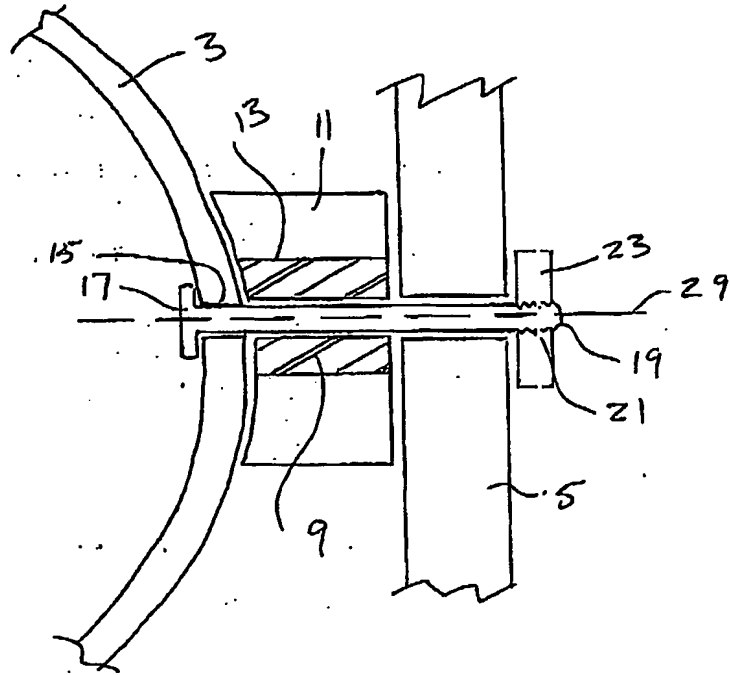


Fig 2



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FIG 3

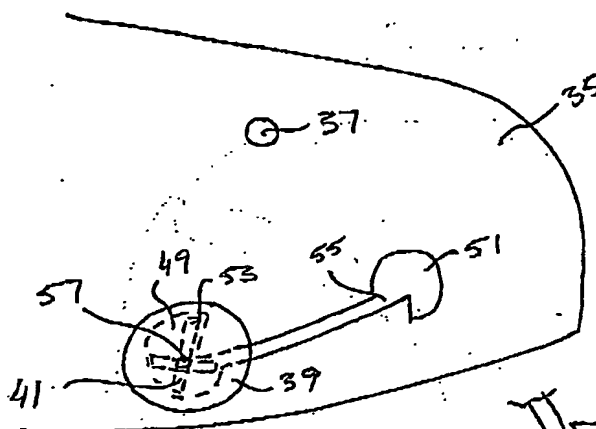
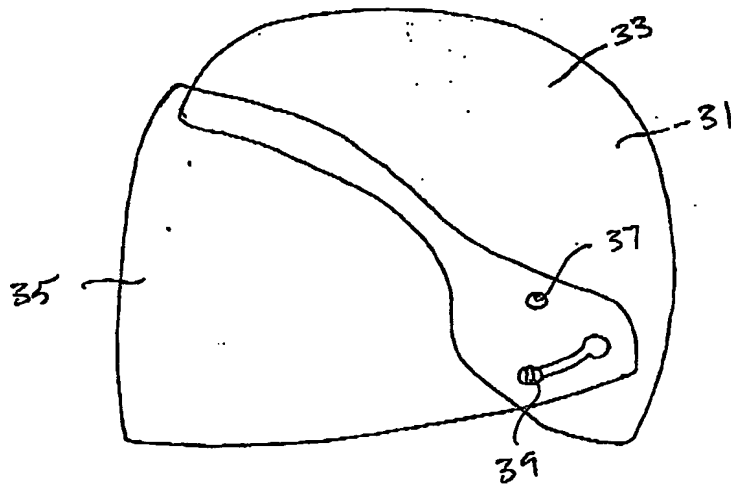


FIG. 4

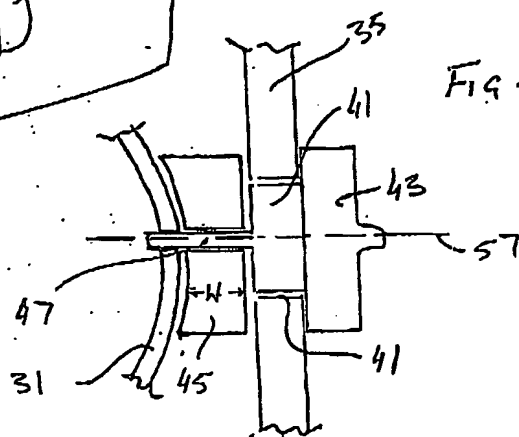
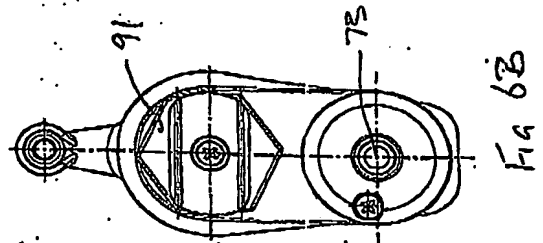
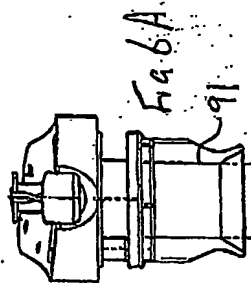
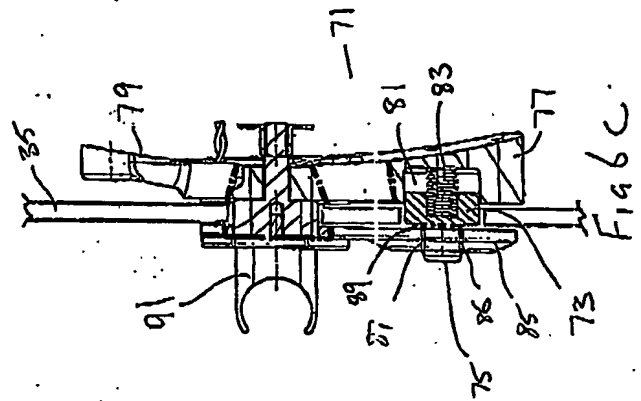
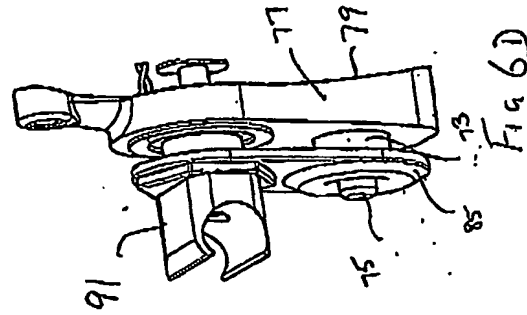
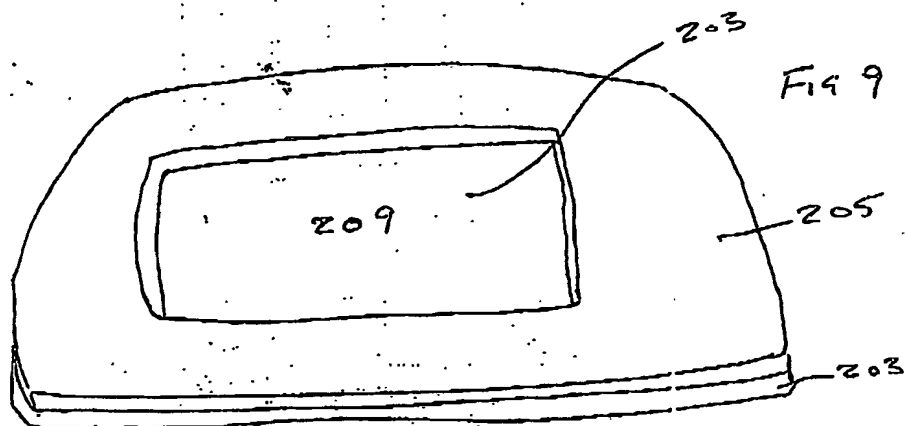
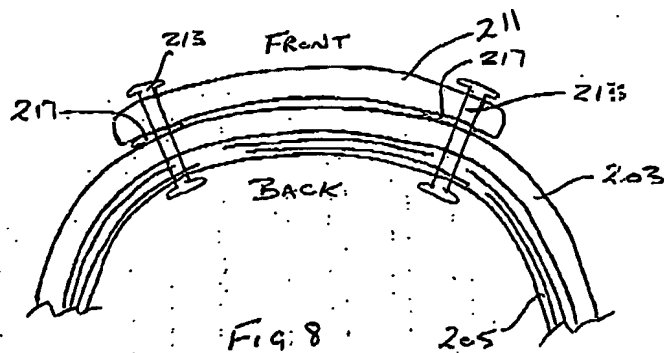
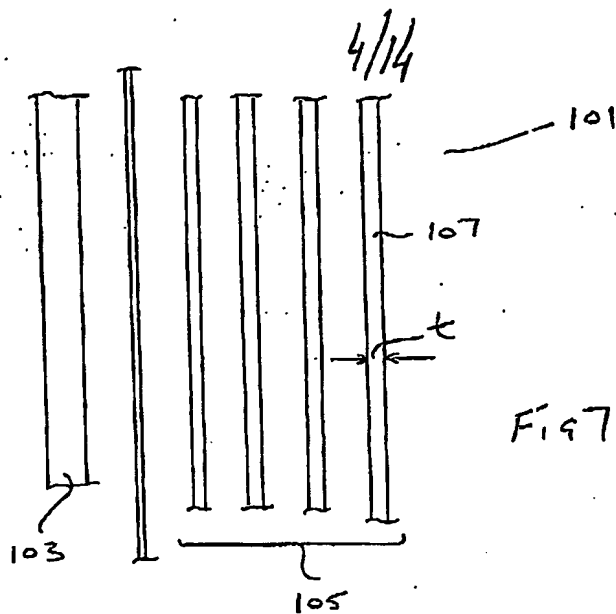


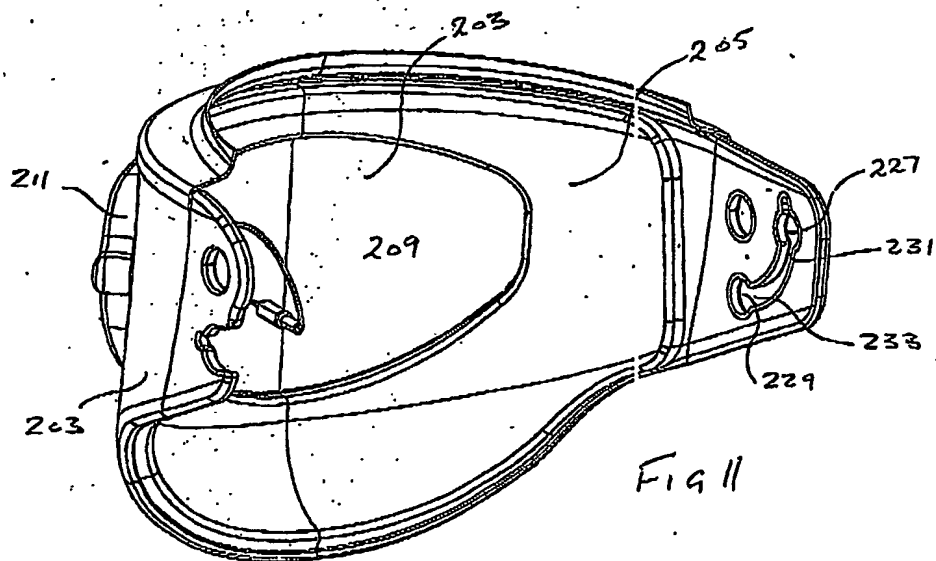
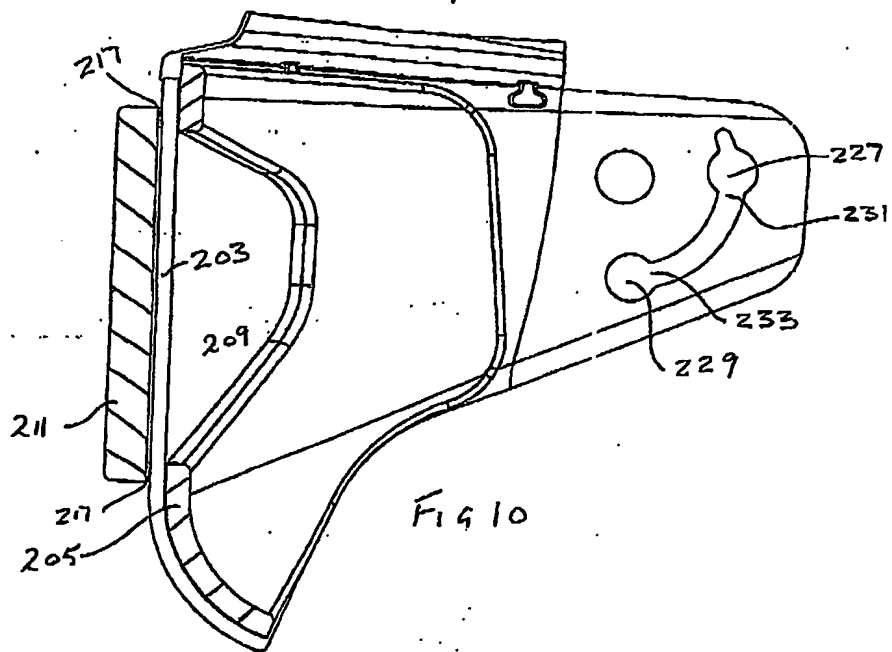
FIG 5

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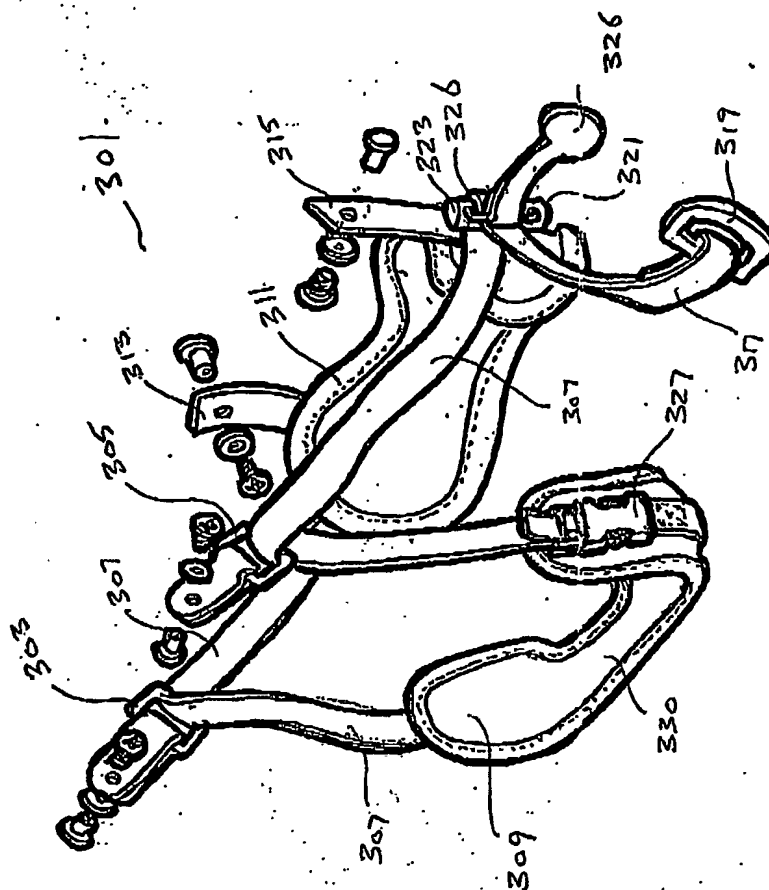


Fig 12

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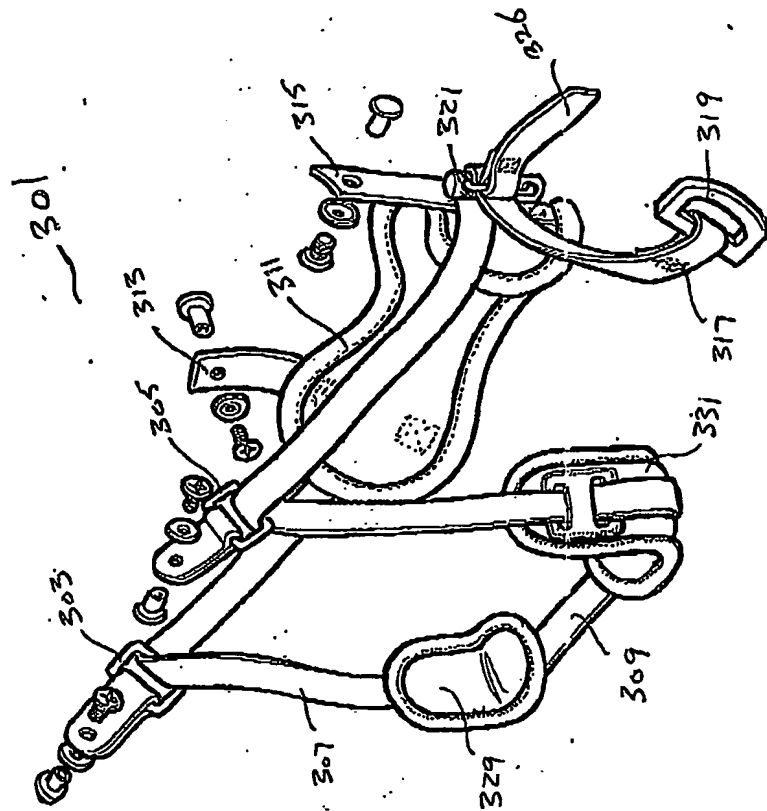


Fig 13

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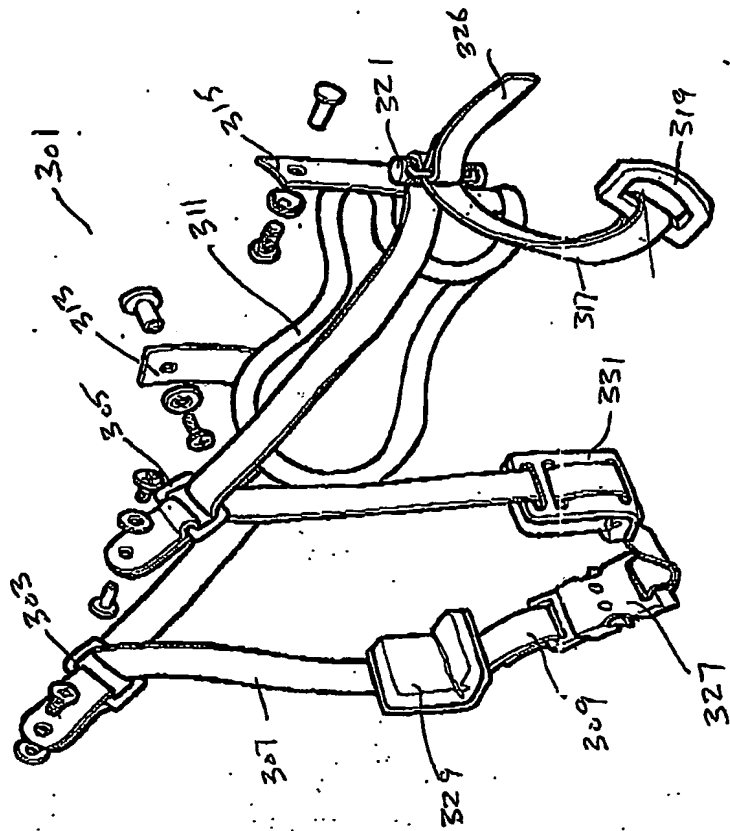
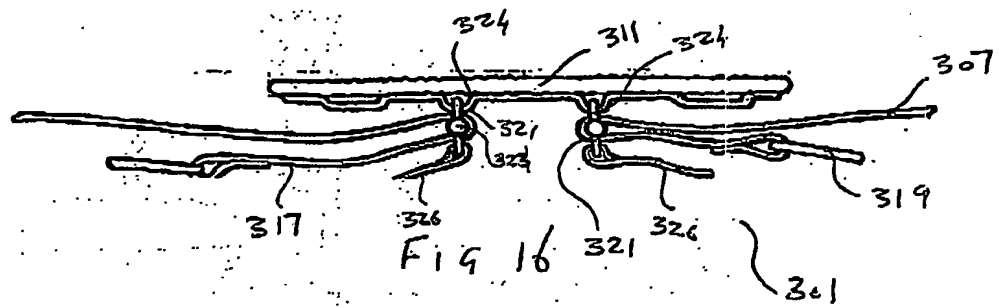
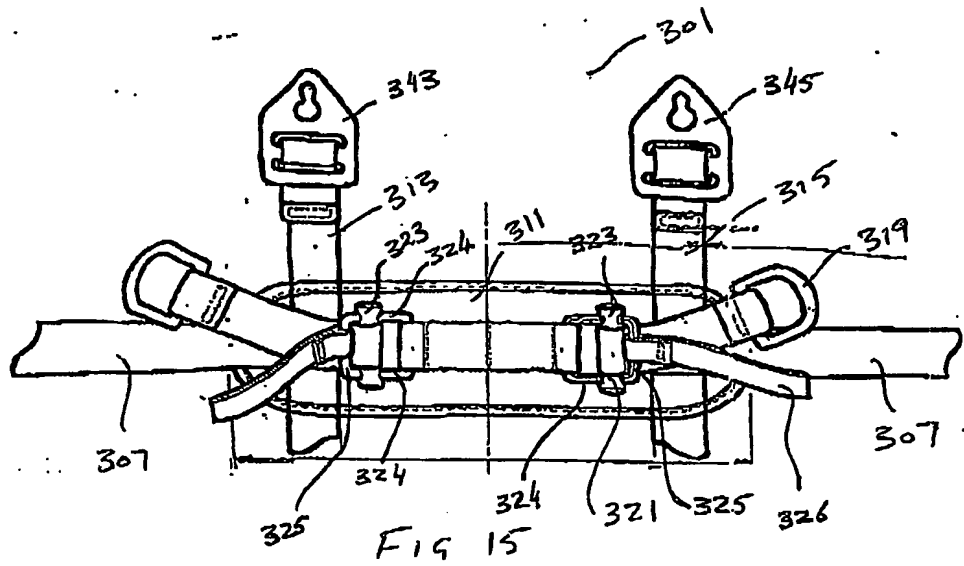


Fig 14

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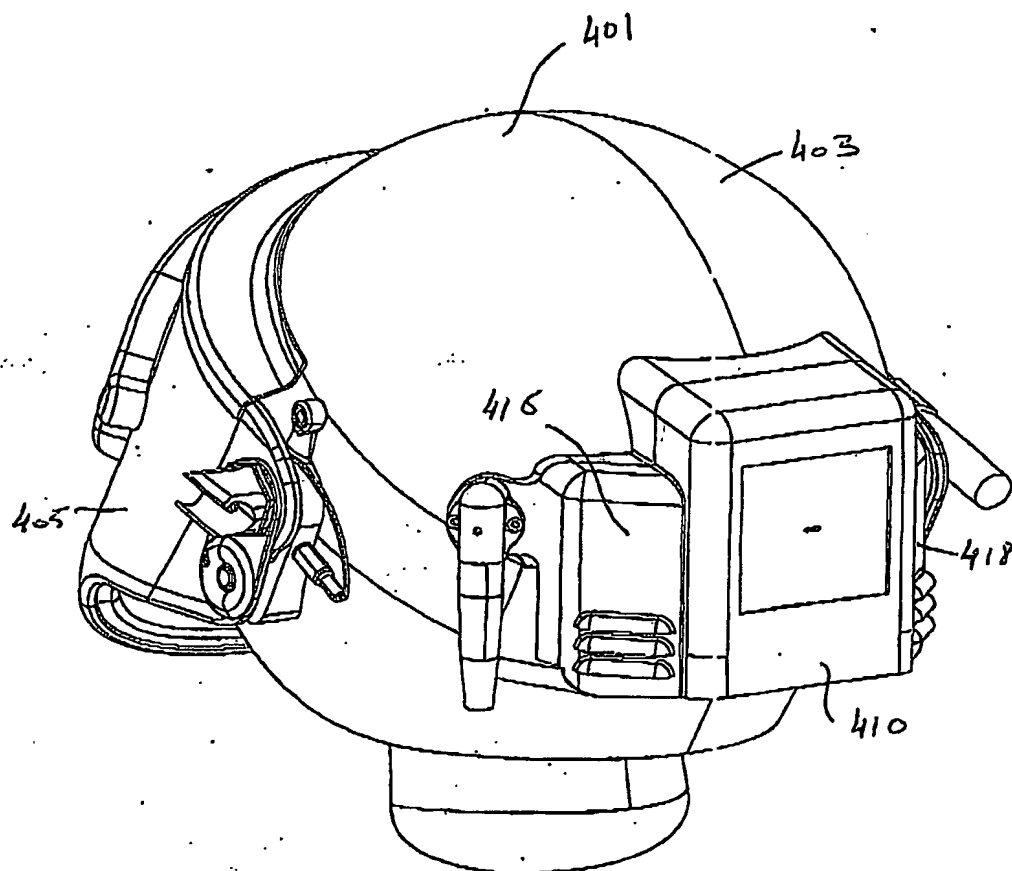


Fig 17

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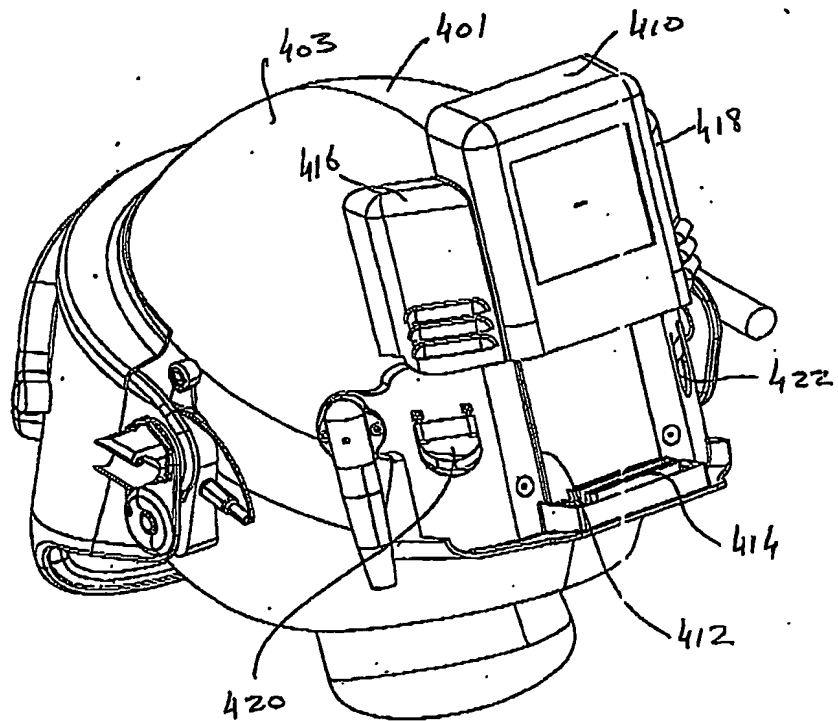


Fig. 18

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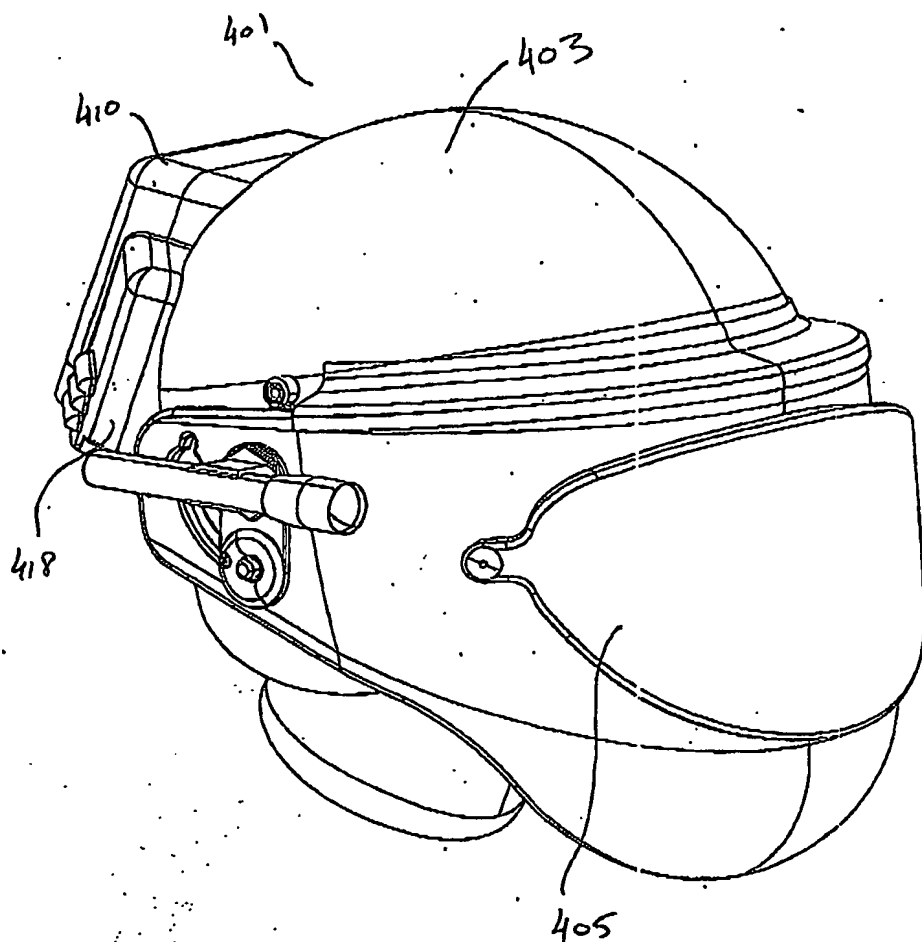


Fig 19

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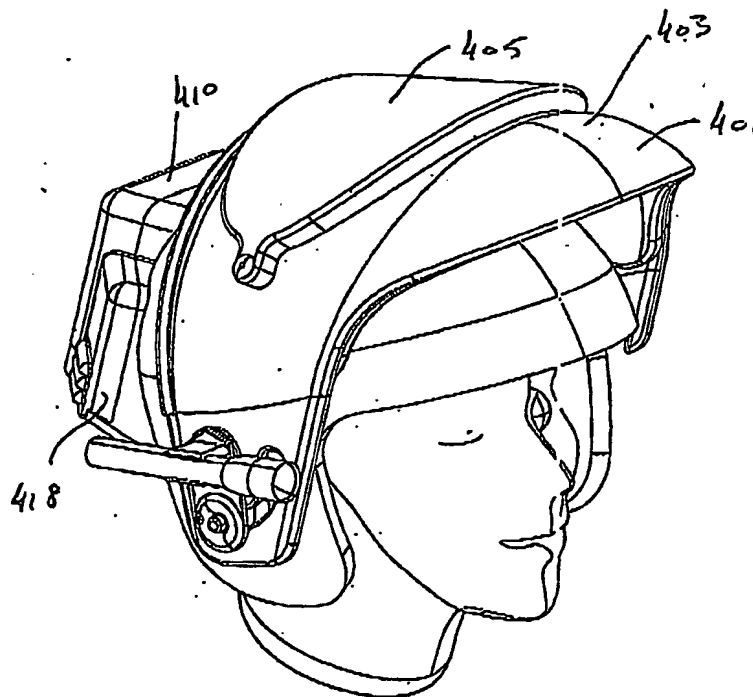


FIG 20



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